



An update of Penile Fractures: Long-term significance of the number of hours elapsed till surgical repair on long-term outcomes

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ABSTRACT

Objective: We updated our data on penile fractures and investigated the significance of the time interval from the incident of the fracture until the operation on the erectile functions and long-term complications.

Material and methods: Between January 2001 and June 2014, 64 patients were operated on with a pre-operative diagnosis of penile fracture. We could evaluate 54 of these patients. The patients were classified into 3 groups according to the time interval from the time of fracture until surgery. The validated Turkish version of the erectile components of International Index of Erectile Function (IIEF) was answered by every patient 3 times after the surgery; before the incident of fracture, at first postoperative year, and at the time of the study (IIEF-5 and question #15 were used). The complications were noted and an erectile function index score was calculated for every patient.

Results: Mean follow up period was 44.9 (± 2.8) months for all patients. There was no statistically significant difference between the 3 groups in terms of the erectile components of IIEF questionnaire scores for the time periods and for individual patients in each separate group. Complications for all groups were also similar.

Conclusion: In consideration of long-term results, neither serious deformities nor erectile dysfunction occur as a consequence of a delay in surgery performed within the first 24 hours in patients without urethral involvement.

Keywords: Erectile dysfunction; fracture; penile fracture; penis; reconstruction; trauma.

Introduction

Penile fracture (PF) is defined as the rupture of the tunica albuginea of the corpus cavernosum due to trauma during rigid erection. PF is a urologic emergency which amends surgical repair of the tunica albuginea.^[1,2] The classic presentation during the early phase consists of a snap or a cracking sound during rigid erection accompanied by pain, and detumescence followed by rapid swelling and ecchymosis.^[3] The clinical presentation is usually enough for the establishment of a correct diagnosis with little need for radiologic evaluation.^[1,4] Imaging modalities such as urethroscopy, urethrography or magnetic resonance imaging (MRI) can be used in case of a suspect urethral injury, which has been diagnosed in 21% of PF cases in the United States.^[5]

Timing of the surgery is a topic of debate concerning immediate or delayed intervention. Although the classical opinion is in favor of a surgical repair as soon as possible, there is

important data in the literature that definitive therapy with excellent results is still possible after a considerable time period passed from the trauma without any increase in long-term complications.^[6-8]

In this current study we updated our series about PF and emphasized the effect of time interval from the incident of fracture until the surgical repair on postoperative erectile function and long-term complications.

Material and methods

Between January 2001 and June 2014, 64 patients were operated with a diagnosis of PF. We retrospectively accessed into the patient charts and medical data and could achieve a contact with 54 of those with a confirmed diagnosis of PF intraoperatively who responded to our telephone calls or mails. Two patients with superficial and deep dorsal vein rupture without tunical tears, and those with a time interval of more than 24 hours between the inci-

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dent of fracture and the surgery were excluded from the study. The validated Turkish version of the erectile components of the International Index of Erectile Function^[9] (IIEF-5 and question #15 were used) was answered 3 times by every patient: i) during preoperative period to assess their pre-fracture erectile function, ii) at postoperative 1 year, and iii) at the time of the study. Professional help for filling out the questionnaires was provided objectively by the health care givers. Mean age of the patients was 40.9 (± 1.6) years. The patients were classified into 3 groups according to the time intervals from the event of PF until surgery as follows: Group 1, 0-6 h; Group 2, 6.1-12 h, and Group 3: 12.1-24 h. To investigate the presence of erectile dysfunction (ED), an 'ED score' was calculated by evaluating the answers to questions 1-5 and 15 of erectile components of the IIEF. The patients were classified based on their scores as having no ED (26-30 pts), mild ED (17-25 pts), moderate ED (11-16 pts), or severe ED (6-10 pts). For patients with ED, further diagnostic and therapeutic workups were performed. Any form of a deformity or a curvature was questioned during the survey and patients with positive subjective findings were checked clinically or by a selfshot photos. The study was performed in compliance with the Declaration of Helsinki.

Through a subcoronal circumferential degloving incision, hematoma was evacuated and the ruptured tunica was repaired with absorbable interrupted sutures. The excess hematoma in the Dartos layer and the surrounding area was left for spontaneous resolution. Intraoperative artificial erection was induced with saline in order to confirm watertight closure of the tunica and the absence of any other tears or deformities. Elastic penile dressing was wrapped around the penis for 12 hours postoperatively. A loosened bandage was kept in place for 2-3 more days postoperatively according to the surgeon's preference. The patients were asked not to have a sexual intercourse for 6 weeks. An informed consent form was requested from patients prior to the operation.

Statistical analyses

Statistical analyses were performed with Statistical Package for the Social Sciences version 21.0 (SPSS Inc.; Chicago, IL, USA). Continuous variables were presented as mean \pm standard error and the groups were compared with Kruskal-Wallis test. Statistical significance was set at a p value of <0.05 .

Results

Patient characteristics and comparisons between the groups are outlined in Table 1. PFs of 54 patients were localized on the proximal 1/3 (n=23; 42%), mid 1/3 (n=21; 39%), and the distal 1/3 (n=10; 19%) part of the penile shaft. Mean follow-up period was 44.9 (± 2.8) months. Mean time interval from the trauma to the surgery was 8.9 (± 0.6) hours (max. 20 hrs).

The etiologic factors for PF were sexual intercourse (72%), masturbation (14%), manipulation (9%) and rolling over in bed with erect penis (5%). Rupture of the right, and left cavernous bodies were detected in 2 (4%) cases either without involvement of the corpus spongiosum (n=1) or associated with urethral laceration (n=1).^[10] We observed blood on external meatus of 2 (4%) patients. Mucosal laceration of the urethra in 4 (7%) patients were repaired using 4/0 absorbable interrupted sutures with primary closure of firstly mucosa, and then corpus spongiosum. A 16-Fr urethral catheter was inserted intraoperatively and removed the next day. The catheters of the patients with urethral rupture were left in place for 10-21 days according to the surgeon's preference.

There was no statistically significant difference between 3 groups in terms of age or the length of the tears (Table 1). The results of the erectile components of the IIEF for every time interval in all 3 groups and for individual patients in each separate group were statistically similar (Figure 1).

Out of the 57 patients mild ED was detected in respective number of patients during preoperative period (n=9), at the first year of the follow-up period (n=10) and thereafter (ie. long-term) (n=13). Four patients aged over 53 years had moderate ED on long term. Patients with moderate ED had risk factors for atherosclerosis, and diabetes and they were administered phosphodiesterase-5 (PDE 5) inhibitors during follow-up.

At postoperative first year 88% (47/54) of the patients had no complications. While 3 (6%) patients (Group 1, n=1, and Group 2, n=2) had mild pain during rigid erection and on prolonged intercourse, and 2 patients (4%) had mild penile deviation (Group 2, n=1 $<15^\circ$ and Group 3, n=1: 20°). In 4 (7%) patients (Groups 1, and 3, n=1, and Group 2, n=2), minimal scarring was observed. In the long term; 93% (50/54) of the patients had no complications. 2 (4%) patients had mild pain during rigid erection and prolonged intercourse. In 2 patients (4%) mild penile deviation towards the side of the fracture was detected (Group 2, n=1, $<15^\circ$ and Group 2, n=3 20°) and in 2 patients minimal scarring was observed.

Discussion

Definitive treatment for PF is surgical repair of the ruptured tunica albuginea. Conservative management has resulted in worse outcomes than surgical repair in different series^[2,11,12], main reason being the increased amount of fibrosis during the spontaneous tissue repair process especially if there is urine extravasation.^[2,5,13]

Diagnosis of PF can be made clinically in most of the cases. If there is suspicion of a urethral injury, the most important sign

Table 1. Summary of patients' characteristics and comparison of the groups

Paper	Overall (n=54)	Group 1 (po.0-6 hrs) (n=17)	Group 2 (po. 6-12 hours) (n=25)	Group 3 (po.>12 hours) (n=12)	p*
Age, years (mean±SD)	40.9±1.6	41.5±3.2	42.2±2.4	37.4±3.0	0.513
Time interval, h (mean±SD)	8.9±0.6	4.4±0.2	8.7±0.5	15.9±0.6	<0.001
Tear length, cm (mean±SD)	1.9±0.1	1.9±0.1	2.0±0.1	1.6±0.2	0.218
Follow-up period, months (mean±SD)	44.9±2.8	40.1±6.1	50.2±3.6	40.6±4.6	0.210
Preoperative IIEF score (mean±SD)	26.9±0.3	27.2±0.6	26.5±0.5	27.6±0.4	0.290
Postoperative IIEF score (mean±SD)	26.5±0.3	26.2±0.6	26.6±0.4	26.8±0.3	0.651
Long-term IIEF score (mean±SD)	25.8±0.6	25.0±1.2	25.8±0.8	26.8±0.6	0.953

PO: Postoperative; IIEF: International Index of Erectile Function

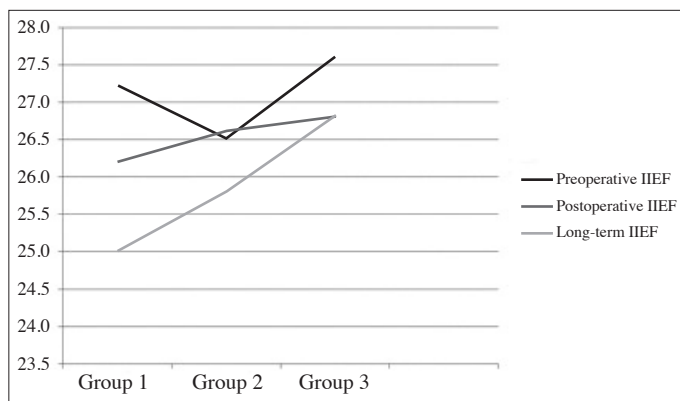


Figure 1. Comparison of preoperative, postoperative 1st year and long-term IIEF scores among 3 groups
IIEF: International Index of Erectile Dysfunction

is blood on the external meatus. In a large national series published by Pariser et al.^[5] preoperative evaluation for urethral injury was performed in 55% of patients with, and 23% of the cases without. In 21% of the study participants urethral injury was detected. In the same large group of patients, on multivariate analysis; concomitant urethral injury was independently associated with hematuria as well as older age and black race.^[5] These rates are highly variable between different ethnicities and cultures. For example, in a series from Europe rates of urethral involvement were reported as 14%-28%, whereas in series from Asia and Middle East rates lower than 2% were indicated.^[14-17] The very low rates from Middle East may be explained by the habitual method to postpone the ejaculation by bending the erect penis manually, called *taghaandan*.^[16] Urethroscopy and retrograde urethrography are the most frequently used modalities for the preoperative evaluation of the urethra.^[5]

We believe that every patient with suspect PF deserves surgery. In our series, we preferred early surgical repair and did not use any preoperative diagnostic tool apart from clinical presentation and physical examination. Because, even in the most severe cases with urinary retention and/or blood on the meatus, the urethral rupture site, if there is any, would be in close proximity to the site of the tunical rupture and can be diagnosed and repaired easily with a careful intraoperative exploration. We postponed intraurethral catheterization in patients with a strong suspicion for a urethral rupture until intraoperative exploration of the corpus spongiosum was performed. Some minor urethral injuries unrecognized or left for spontaneous healing may heal without any long-term sequela or may end up with urinary problems, but patients undergoing surgical repair are more likely to have no complaints in the long term.^[2]

One clinical situation which may mimic PF is bleeding from the dorsal penile vasculature. Superficial or deep dorsal penile vein or artery can be traumatized and may bleed mimicking tunical rupture. In these cases, on physical examination rapid detumescence, pain and the characteristic snapping sound of the tunical rupture won't be observed and the amount of ecchymosis will be somewhat less than that detected in an actual tunical rupture. But even on the most careful physical examination, dorsal vascular bleeding may be mistaken for a PF as was the case in our 2 (2/64; 3%) patients.

In a recent meta-analysis, conservative vs surgical treatment together with immediate vs delayed surgical intervention were compared in terms of postoperative erectile function and complications. The results were in favour of early surgical intervention in all of the parameters, namely; erectile function, plaque formation, and penile curvature. On the same study, Amer et al.^[1] concluded that emergent surgery resulted in less overall complications including painful erections.

In most of the series in the literature, there is a bias about the definition of “immediate or emergent” and “early” surgery, where immediate surgery is mostly defined as those performed within the first 24 hours after the incident, which is the time limit and the actual topic of our study. In order to achieve this goal, three patients in the original series whose PFs occurred more than 24 hours previously were excluded from the present study.

The most important consequences that must be evaluated postoperatively after a repair surgery for a PF are about the erectile status of the patient. Our aim in updating our series about PF was to investigate the effect of the time interval elapsed from the the incident of fracture until surgery on erectile functions and complication rates in the long term. Can the surgery be postponed up to 24 hours after the penile trauma, provided that every ideal situation related with the general health status of the patient and the surgical setting are maintained, with no insult on the erectile status of the patient in the long term?

There was no statistically significant difference between the long-term postoperative results of the 3 groups. Intragroup and intergroup evaluations showed comparable long-term IIEF results. All patients operated on during the first 6 hours after the incident of fracture had similar long-term results in intragroup, and also intergroup comparisons with patients operated 6-12 h and >12.1-24 h after the traumatic event (Figure 1). A certain period of time seems to be tolerable without compromising the erectile status in the long term if the patient has no urine leakage. For patients with ED in the long term, further diagnostic and therapeutic workups were performed.

We found out that the complications related with the PF and its early surgical repair stabilize within the first year and will be stable mostly afterwards except for some degree of palpable scarring, which tends to resolve with time. Although these results have limited value due to scarce number of cases, some comments can be made. We had 1 patient with a clinically significant postoperative penile deviation of 20°, while penile deviation of <15° in one patient was tolerable. Unfortunately excess, but necessary trimming of both sides of the tunical rupture site caused penile deviation in these individual cases. Although trimming of the edges of the rupture site is not defined in the technique of penile fracture repair, very minimal trimming may be necessary, if any at all, in extreme cases for adequate postoperative healing of the rupture site. Too much sacrifice of the tunical tissue in every effort for a perfect closure of the tunical defect may end up with significant penile deviation, so utmost care should be exercised. Penile deviation caused by excessive loss of the tunical material seems to persist, whereas palpable scarring due to a rough closure of the tunica albuginea resolves significantly in the long term.

A few limitations of our study can be indicated. The necessity to provide a professional medical assistance to the patient for answering erectile components of the IIEF may have impaired objectivity, but great effort was given by the medical staff not to make unnecessary interferences. Another limitation of our study was small number of our patients with urethral lesions and possible urine leakage. In cases with a strong suspicion for urinary leakage, like those with presence of blood on the external meatus, further studies on the optimal timing of the operation for better long-term results must be conducted.

Our study confirms the good results of immediate and early postoperative repair of ruptured cavernous bodies with absorbable sutures, with improved functional outcomes and low complication rates. Additionally, neither serious deformities nor ED occur in the long-term as a result of delayed surgery performed within the first 24 hours after the onset of penile fracture in patients without urethral involvement.

Ethics Committee Approval: Authors declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki “Ethical Principles for Medical Research Involving Human Subjects”, (amended in October 2013).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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